



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/665,209	09/22/2003	Tokihiro Nishihara	025720-00012	5738
4372	7590	12/14/2004	EXAMINER HAM, SEUNGSOOK	
ARENT FOX KINTNER PLOTKIN & KAHN 1050 CONNECTICUT AVENUE, N.W. SUITE 400 WASHINGTON, DC 20036			ART UNIT 2817	PAPER NUMBER

DATE MAILED: 12/14/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/665,209

Applicant(s)

NISHIHARA ET AL.

Examiner

Seungsook Ham

Art Unit

2817

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 15 January 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 September 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
  - 2) ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 9/22/03.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Claim Objections***

Claims 4-6 are objected to because of the following informalities:

In claims 4 and 5, "the conductive layers" lacks antecedent basis; and

In claim 6, "the bump base layers" lacks antecedent basis. Appropriate correction is required.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1, 2, 7 and 9-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Taniguchi et al. (US Pat. Appl. Publ. 2003/0058066) in view of Ella (US 5,872,493).

Taniguchi et al. (figs. 1-4) discloses a filter device comprising: a filter element having a plurality of piezoelectric resonators arranged in series arms 8, 9 and parallel arms 10-12, a package 4 that houses the filter element in a face-down state; the filter element and the package being electrically connected to each other through bumps 29-31; the package having a plurality of first pad parts 23-27 on which the bumps are placed; and a plurality of transmission paths 45-48 that electrically connect the first pad parts to the outside (i.e., external electrodes 41-44); the filter element having a plurality of second pad parts 13-17 that are electrically connected to the first pad parts through the bumps, and a plurality of wiring parts 18-22 that electrically connect the second pads to the resonators and electrically connect the resonators to one another; and inductances (see fig. 4, paragraph [0075]) formed with the transmission paths being connected in series to the resonators. However, Taniguchi et al. does not show the resonators being piezoelectric thin-film resonators (or Bulk Acoustic Wave resonators).

Ella addresses the problems of SAW filters on a flip-chip package (col. 1, lines 21-37), and teaches using Bulk Acoustic Wave resonators/filter (i.e., piezoelectric thin-film resonators) in a flip-chip package (fig. 12) to avoid the drawbacks that are associated with SAW filters on a flip-chip package (col. 1, line 37 – col. 2, line 19).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention was made to use piezoelectric thin-film resonators instead of SAW resonators in the device of Taniguchi et al. to overcome the drawbacks that are existed in a SAW filter package and to reduce the overall fabrication costs as taught by Ella (see col. 1, lines 21-52, col. 2, lines 21-26, col. 4, lines 40-54).

Regarding claims 2 and 7, providing an additional conductive layer to the wiring parts and varying the length/width ratio of the wiring parts are considered as obvious modifications since it is well known in the art to vary the thickness or a ratio of length/width of the wiring parts to obtain a desired impedance characteristics.

Claim 9 is inherent from the device of Taniguichi et al. (see fig. 2) since the size of the bumps 28-32 are larger than the first pad parts 23-27.

Regarding claim 12, Taniguichi et al. (fig. 3) shows the size of the filter element X is smaller than the size of the package 4 where the transmission paths 45-49 are disposed outside of the filter elements. The specific range of the transmission paths outside of the filter elements are considered as an obvious modification since Taniguichi et al. teaches that the transmission paths are disposed outside of the filter element to obtain a superior filter characteristics (paragraph [0095]).

Regarding claim 14, the specific range of the transmission paths line widths are considered as an obvious modification to obtain a desired inductance value.

Regarding claim 18, arranging the resonators in a lattice fashion is considered as a design choice since ladder or lattice shape filter arrangements are well known in the art.

Claims 3-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Taniguchi et al. (US Pat. Appl. Publ. 2003/0058066) in view of Ella (US 5,872,493) as applied to claims 1 and 2 above, and further in view of Watanabe et al. (US 6,731,046).

The modified device of Taniguchi et al. does not show providing additional pad layer for the second pad parts. Watanabe et al. (fig. 1B) discloses a filter element

having the second pad parts having a plurality layers Xb-Xe connected to the first pad parts 14 through bumps 12 (see fig. 4). It would have been obvious to one of ordinary skill in the art to provide an additional pad layer in the second pad parts of the modified device of Taniguchi et al. to provide an excellent bonding properties to the bumps as taught by Watanabe et al. (col. 6, lines 55-67).

Claims 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Taniguchi et al. (US Pat. Appl. Publ. 2003/0058066) in view of Ella (US 5,872,493) as applied to claim 1 above, and further in view of Lakin (US 5,942,958).

The modified device of Taniguchi et al. does not show the resonators are arranged in series arms in an aligned row and the resonators arranged in parallel arms are disposed on opposite sides of the aligned row.

Larkin (figs. 3A-3C) discloses a piezoelectric thin-film filter having a plurality of series resonators X31, X35A, X35B, X39 are aligned in a row, and a plurality of parallel resonators X33AA, X33BA, X33AB, X33BB, X37AA, X37BA are disposed in opposite sides of the row.

It would have been obvious to one of ordinary skill in the art to arrange the series resonators in an aligned row and the parallel resonators in opposite sides of the aligned row in the modified device of Taniguchi et al. to minimize the size of the filter device as taught by Larkin (see abstract).

Claims 19 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Taniguchi et al. (US Pat. Appl. Publ. 2003/0058066) in view of Ella (US 5,872,493) as applied to claim 1 above, and further in view of Misawa et al. (EP 1,076,414).

The modified device of Taniguichi et al. does not show the package having seal rings and vias on the side walls. Misawa et al. (figs. 8 and 9) discloses a similar filter device having a package having a seal rings 47F and vias 41d (see fig. 3). It would have been obvious to one of ordinary skill in the art to provide conductive seal rings for hermetic sealing and vias for connecting conductive/transmission paths in the modified device of Taniguchi et al. since such design techniques are well known in the art as shown by Misawa et al.

### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Taga (US '071) discloses piezoelectric filter package having a bonding pad having a plurality of bonding layer; and

Ella (US 6,081,171 and 6,509,813) and Bradley et al. (US '664) disclose a BAW filter device having a flip-chip package.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Seungsook Ham whose telephone number is (571) 272-2405. The examiner can normally be reached on Monday-Thursday, 8:00AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Pascal can be reached on (571)-272-1769. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 2817

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Seungsook Ham  
Primary Examiner  
Art Unit 2817

sh